

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|   |  |  |
|---|--|--|
| Applicant's or agent's file reference<br><b>RPH. P52666WO</b> | <b>FOR FURTHER<br/>ACTION</b><br><small>see Form PCT/ISA/220<br/>as well as, where applicable, item 5 below.</small> |  |
| International application No.<br><br><b>PCT/GB2004/002663</b> | International filing date (day/month/year)<br><br><b>21/06/2004</b>  | (Earliest) Priority Date (day/month/year)<br><br><b>21/06/2003</b> |
| Applicant<br><br><b>WEATHERFORD/LAMB, INC.</b>                |  |  |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

**4. With regard to the title,**

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**DRIVE CIRCUIT AND ELECTRIC MOTOR FOR SUBMERSIBLE PUMPS**

**5. With regard to the abstract,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. With regard to the drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 12

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2004/002663

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

3

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claim: 3

Electric submersible pump having filtering means  
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2. claims: 6-17

Drive circuit with a variable voltage source  
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3. claims: 18,20

Drive circuit having means for minimising the output power of the drive circuit at a fixed speed  
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4. claims: 19,21,22

Drive circuit with means for maximising the motor speed for a given output power  
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5. claims: 23-25

Downhole permanent magnet motor having an annular gap such that the fluid flow is turbulent during rotation of the rotor above a critical speed  
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6. claims: 26-29

Downhole motor having a bearing with spiral grooving  
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/002663

## A. CLASSIFICATION OF SUBJECT MATTER

7 H02P6/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                          | Relevant to claim No. |
|------------|---|-----------------------|
| X          | PATENT ABSTRACTS OF JAPAN<br>vol. 2003, no. 05,<br>12 May 2003 (2003-05-12)                                 | 1,2,4,5               |
| Y          | -& JP 2003 003985 A (MITSUBISHI HEAVY IND<br>LTD), 8 January 2003 (2003-01-08)<br>abstract<br>-----<br>-/-- | 3                     |



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

22 September 2004

Date of mailing of the international search report

19.01.2005

Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/002663

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|----------|---|-----------------------|
| Y        | SUNG-JUN KIM ET AL: "A novel filter design for suppression of high voltage gradient in voltage-fed PWM inverter" APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, 1997. APEC '97 CONFERENCE PROCEEDINGS 1997., TWELFTH ANNUAL ATLANTA, GA, USA 23-27 FEB. 1997, NEW YORK, NY, USA, IEEE, US, 23 February 1997 (1997-02-23), pages 122-127, XP010215809 ISBN: 0-7803-3704-2 Paragraph I. Introduction<br>----- | 3                     |
| A        | US 4 623 830 A (PENEDER FRANZ ET AL) 18 November 1986 (1986-11-18) column 1, line 37 - line 42 column 2, line 52 - line 53<br>-----   | 3                     |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB2004/002663

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---|---------------------|----------------------------|---------------------|
| JP 2003003985                             | A | 08-01-2003          | NONE                       |                     |
| US 4623830                                | A | 18-11-1986          | AT 21982 T                 | 15-09-1986          |
|   |   |                     | CA 1218694 A1              | 03-03-1987          |
|   |   |                     | DE 3460615 D1              | 09-10-1986          |
|   |   |                     | EP 0131815 A1              | 23-01-1985          |
|   |   |                     | ES 8506949 A1              | 16-11-1985          |
|   |   |                     | IN 161365 A1               | 14-11-1987          |
|   |   |                     | ZA 8405346 A               | 27-03-1985          |